DOCUMENT RESUME

ED 223 231 IR 010 482

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TITLE The Computer Threat to Educational Technology.
PUB DATE May 82
NOTE 6p.; Paper presented at the Annual Meeting of the Association for Educational Communications and Technology, Research and Theory Division (Dallas, TX, May 1982). For other papers, see IR 010 442-487.
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; *Computer Programs; *Computers; *Educational Innovation; Educational Research; Instructional Materials; *Performance Factors; Programed Instruction; Research Problems
IDENTIFIERS *AECT Research and Theory Division Meeting

ABSTRACT

Sensitivity to assumptions concerning the applications of computers to education is needed, as educational practices are strongly shaped by both group and individual assumptions. An educational practice will not necessarily be improved if done by a computer. A consequence of searching for computer uses has been a tendency to build from computer strengths, not student weaknesses, and specific assumptions by designers concerning human behavior have created unexpected effects. Most importantly, educational research may not have a positive influence on computer uses in education, as generally assumed. The existence of computer assisted instruction (CAI) is made tenuous by problems of poorly developed materials, limited availability of properly developed materials, locally produced materials, and widespread copying of materials. Therefore, not only is it questionable to assume that educational research can have a positive impact on technology implementation in the schools, but some effective methods such as programmed instruction and CAI can be almost completely negated by premature and inadequate implementations within the educational system. Videodiscs and complex packages such as word processing can help maintain centralized control over computer uses. Prediction of eventual educational roles for computers is difficult, and effective roles should be promoted. (LMM)

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THE COMPUTER THREAT TO EDUCATIONAL TECHNOLOGY

by

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THE COMPUTER THREAT TO EDUCATIONAL TECHNOLOGY

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Our educational practices are strongly shaped by our assumptions, usually implicit, including both our group assumptions and individual ones. They include our expectations about what students will have learned before reaching a certain level, what they can learn in a fixed period of time, and what factors external to the student will influence learning, such as materials, mode of presentation, classroom structure, etc.

The topic of discussion at this point, however, is not the general role of assumptions, but the specific role that assumptions play in the application of computers to education. The following discussion is not intended to be an exhaustive analysis of all possible assumptions, but rather a relatively quick consideration of some of the more important assumptions, to increase the sensitivity of the reader.

THE LAW OF THE HAMMER

Many of our assumptions regarding the use of computers are not explicit. One of these assumptions operates in a manner similar to the "Law of the hammer" which has been around for many years. The statement of the law is (roughly) "If you give a hammer to a two-year old, suddenly a lot of things will need hammering." If you change "hammer" to "computer", "two-year old" to "educator", and "hammering" to "computing", you have a description of the effect.

Many people like working with computers and, myself included, they try to find different uses for computers. This attitude has some positive aspects, in that new applications of computers (or hammers) are more likely to be discovered when they are applied in a great many contexts. Yet the damage that may occur, in both cases, hammer or computer, is likely to put an expensive price on the new information which is obtained. The assumption, in education, sometimes seems to be that an educational practice will be improved if it is done by a computer, or that something which is not worth doing will become valuable if done by computer. A chronic example of this assumption is seen in the overproduction of extensive statistical summaries which are rarely used.

CONSEQUENCES OF THE HAMMER

One of the consequences of searching for ways to use computers has been a tendency to build from computer strengths rather than to build toward student weaknesses. A special case of this is our tendency to use computers for instruction of skills which have become

less important because of computers and other electronic technology, such as calculators. This is, no doubt, because it is easier to construct CAI lessons for tasks which computers can do very well.

The discipline in which the greatest number of CAI programs exists is mathematics, particularly arithmetic skills, with one estimate being that "95% of the large, computer-managed packages are *arithmetic* programs." (EPIE Reports, 1981, p. 8)

In addition to the assumptions made about the use of computers in general, there are assumptions specific to particular kinds of applications. Assumptions play a particularly important role in simulation or simulation/game applications. Weizenbaum (1980) relates that an MIT graduate student, while deeply engaged in a game, was heard to say, "We ought to get more points for killing than for merely surviving." (p. 442)

This latter relationship is an example of an assumption about human behavior, made by the designer, the effects of which, although likely to be subtle, might be completely in opposition to what the designer desired. The most important assumption for the role of educational technology, however, is the research assumption.

THE RESEARCH ASSUMPTION

Underlying a general interest in the application of computers to education, there is often an assumption that educational research can have a positive influence on the ways in which computers are used in education. Is this assumption warranted? There are at least two lines of reasoning that suggest that it is not.

In 1965, the Learning Research and Development Center (LRDC) at the University of Pittsburgh had a computer system that would provide spelling drills as one of their many investigations into the uses of computers in education (for a more complete description, see Ragsdale, 1969). At that time, and over the following years, a number of other educational research institutions had similar systems. The major deterrent to the transfer of new techniques (about the computerized improvement of spelling) to the classroom was the cost of the equipment required.

The LRDC equipment included a Digital Equipment Corporation PDP-7 computer with a base price (not including options) in excess of $40,000, plus a random-access audio unit that added at least another $10,000. Prices of computers and other electronic equipment declined over the years, but a random-access audio unit was still a four-figure item in the late 1970's. Recently, the picture changed completely when Texas Instruments offered a spelling drill device that incorporated microprocessor, keyboard, and random-access audio for approximately $50 (U.S.).

When a large corporation, like Texas Instruments, makes a decision to mass-produce an educational device at a low price, the technological impact is much greater than that of the accumulation of instructional knowledge by educational researchers. In fairness, it must be pointed out that research related to spelling drills was not a major priority at

LRDC, or with other similar institutions, but the point is still valid. Similarly, it is not being alleged that the Texas Instruments device is devoid of any influence from educational research, but that the point is irrelevant. The careful accumulation of educational wisdom intended for institutional use can become irrelevant to educational practice when industry is able to (almost instantaneously) provide the necessary electronic technology, in an inexpensive form, directly to the student.

Another area of concern was outlined by Scriven (1981), when he asserted that although the widespread use of computers appeared to be inevitable, it did not follow that all applications of computers were similarly inevitable. He cited programmed instruction (PI) and performance contracting as examples of applications of instructional technology which had been rejected by the educational community, although it appears that they work when applied in a careful manner.

Programmed instruction is a particularly interesting case, since it has had a long and productive history in military and industrial applications, but was very short-lived within the educational establishment. A plausible explanation for this result is that the initial success of PI was based on carefully developed sequences prepared by experts, whereas the later rejection was based on a flood of material which was hastily prepared by untrained authors. One could also say that the schools saw the initial success of relatively expensive PI and then acquired the cheapest material that was available for their needs, or created their own, with the unsurprising result that the materials were not satisfactory.

If we look at the history of CAI, we may conclude that it is following the same path as PI. Over the past 20+ years, CAI systems and materials have been developed at a number of research sites. The production of materials has been expensive, requiring as many as 300 hours of effort to produce one hour of CAI instruction. There have been, however, generally good results from those large-scale efforts, such as CAN in Ontario and PLATO in the U.S., which have invested large amounts of skilled-labor time in their materials.

Up to this point, due to the expensive costs associated with CAI on large computer systems, there has been little personal experience with CAI in most schools. This situation is now changing very rapidly, as in the case with the spelling drills, and it is now possible for most schools and/or teachers to use or create CAI on microcomputers located in the classroom. Just as with PI, the CAI material which is now flooding the educational market is cheaper, but less carefully developed than the prototypes which have been shown to be successful in earlier research.

It should be pointed out, that a major share of the blame for poorly developed microcomputer CAI materials rests with the schools themselves. Because there is widespread copying of CAI program cassettes and disks, the authors can't anticipate revenue commensurate with the number of users of their programs and can't afford to invest much development time in the programs, unless they are major vendors who can afford to take the necessary steps to protect their work.

Even more discouraging, in my eyes, is the plan of some school boards to make CAI the major application for microcomputers, even though there is little material available and only a small portion of that is properly developed. The existence of CAI as a useful

application in educational institutions becomes even more tenuous with the planned use of locally-produced CAI lessons within some boards, continuing in the tradition of producing curriculum materials rather than using or adapting those already available. Meanwhile, as we produce the sequel to "The life and death of PI" with CAI in the starring role, the applications of CAI in military and industrial installations continue to prosper.

Therefore, not only is it questionable to assume that educational research can have a positive impact on the kinds of technology made available to the schools, as with spelling drills, but in some cases it seems that those effective methods which are discovered, such as PI and CAI, can be almost completely negated by premature and inadequate implementations within the educational system. Computers may be robust, in that people will need to use and understand computers in order to work and live, but some of their applications are fragile. As a result, although computers are not like teaching machines and language labs, in that they are a growing part of the everyday world, we must question the assumption that computers will be used in schools to do all the tasks which are best suited for computers. Those who hold a more optimistic view of the inevitability of CAI, such as Evans (1980), also tend to view PI as fatally flawed and ignore the continuing success of carefully prepared programmed instruction.

There are some steps being taken to maintain centralized control over the uses of computers in education. One is the use of media such as videodiscs, which prevent copying and thereby allow expensive development costs to be recouped. Another is increased emphasis on expensive and complex packages such as word processing, which are unlikely to be developed locally and can be used as tools to assist students. At this point it is difficult to predict the eventual role(s) for computers in education. We must be as influential as possible in promoting effective roles.

REFERENCES

EPIE Report. *Microcomputer courseware/Microprocessor games*. Reports 98/99m. Stony Brook, NY: EPIE Institute, 1981.

Evans, C. *The micro millenium*. New York: Viking Press, 1980.

Ragsdale, R. G. The learning research and development center's computer assisted laboratory. In *Computers in the psychology laboratory*. Maynard, MA: Digital Equipment Corporation, 1969, 61-65.

Scriven, M. Current developments in evaluation theory. Invited address presented to the American Educational Research Association, Los Angeles, April 13-17, 1981.

Weizenbaum, J. Once more the computer revolution. In M. L. Dertouzos & J. Moses *The computer age: A twenty year view*. Cambridge, MA: MIT Press, 1980.